

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in view of the present amendments and in light of the following discussion, is respectfully requested.

Claims 1-11 and 30-31 are pending in the present application. Claims 1 and 31 are amended. Claims 12-29 are canceled without prejudice or disclaimer. Support for the amendment to Claim 1 can be found in the specification at least at page 14, lines 14-17; page 21, line 27 to page 22, line 3; page 34, lines 2-4; and in Figure 3. Support for the amendment to Claim 31 can be found in Claims 1 and 2, inasmuch as Claim 31 is placed in independent form. Thus, no new matter is added.

The outstanding Office Action rejected Claims 1-4, 7-11, and 30 under 35 U.S.C. § 102(b) as anticipated by Kawamura et al. (U.S. Patent Publication No. 2004/0025784, hereinafter "Kawamura '784"); rejected Claims 1 and 5-6 under 35 U.S.C. § 103(a) as unpatentable over Kawamura et al. (U.S. Patent Publication No. 2004/0148859, hereinafter "Kawamura '859") in view of Kawamura '784; and rejected Claim 31 under 35 U.S.C. § 103(a) as unpatentable over Kawamura '784 in view of Bowe et al. (U.S. Patent Publication No. 2003/0105172, hereinafter "Bowe").

At the outset, Applicants note with appreciation the courtesy of a telephone interview granted to Applicants' representative by Examiner Imran Akram. In combination with the Interview Summary provided by Examiner Akram, the substance of the telephone interview is substantially summarized below in accordance with M.P.E.P. § 713.04.

Applicants respectfully traverse the rejection of Claims 1-4, 7-11, and 30 under 35 U.S.C. § 102(b) as anticipated by Kawamura '784.

Amended independent Claim 1, recites, in part:

a catalyst carrying member disposed in said flow path
and including a catalyst, said catalyst is supported independent
of wall surfaces of said microchannel portion that define said
flow path;

wherein the catalyst carrying member is wire shaped.

Thus, a microreactor that includes a catalyst carrying member disposed in a flow path and includes a catalyst. The catalyst is supported independent of wall surfaces of a microchannel portion that defines the flow path. The catalyst carrying member is wire shaped. Applicants have recognized that one benefit of the above-noted feature is improved reaction efficiency as it is possible to select substrates without considering the catalyst supportability thereof.¹

Turning now to the cited art, Kawamura '784 describes a compact chemical reactor. However, Kawamura '784 fails to describe a catalyst carrying member disposed in a flow path and includes a catalyst, that the catalyst is supported independent of wall surfaces of the microchannel portion that define the flow path and that the catalyst carrying member is wire shaped. Instead, as discussed in the telephone interview, Kawamura '784 describes a reaction catalyst layer (13) that is provided an inner wall surface of a groove (12) on a substrate (11).² In other words, Kawamura '784 fails to disclose or suggest a catalyst that is supported independent of wall surfaces and a catalyst carrying member that is wire shaped.

Accordingly, Applicants respectfully submit that amended independent Claim 1, and claims depending therefrom, patentably define over Kawamura '784. Therefore, Applicants respectfully request the rejection of Claims 1-4, 7-11, and 30 under 35 U.S.C. § 102(b) be withdrawn.

In addition, Applicants respectfully traverse the rejection of Claims 1 and 5-6 under 35 U.S.C. § 103(a) as unpatentable over Kawamura '859 in view of Kawamura '784.

As discussed above, amended independent Claim 1 recites a catalyst carrying member disposed in a flow path and includes a catalyst. The catalyst is supported independent of wall surfaces of a microchannel portion that defines the flow path. The catalyst carrying member is wire shaped.

¹ See specification at page 17, lines 17-27.

² See Kawamura '784 at paragraph [0042].

Turning now to the cited art, Kawamura '859 describes a chemical reaction apparatus. However, Kawamura '859 fails to describe a catalyst that is supported independent of wall surfaces of a microchannel portion that defines the flow path and a catalyst carrying member that is wire shaped. Instead, as discussed in the telephone interview, Kawamura '859 describes a catalyst layer (15) that is formed on an inner wall surface of a flow path (13) in a first substrate (11).³ In other words, Kawamura '859 fails to disclose or suggest a catalyst that is supported independent of wall surfaces and a catalyst carrying member that is wire shaped.

As discussed above, amended independent Claim 1 patentably defines over Kawamura '784.

Accordingly, no reasonable combination of Kawamura '859 and Kawamura '784 would include all of the features recited in amended independent Claim 1, or claims depending therefrom. Therefore, Applicants respectfully request the rejection of Claims 1 and 5-6 under 35 U.S.C. § 103(a) be withdrawn.

In addition, Applicants respectfully traverse the rejection of Claim 31 under 35 U.S.C. § 103(a) as unpatentable over Kawamura '784 in view of Bowe.

Amended independent Claim 31 recites a catalyst carrying member disposed in a flow path and includes a catalyst. The catalyst is supported independent of wall surfaces of a microchannel portion that defines the flow path. The catalyst carrying member includes a metal base body, a metal oxide film which covers the metal base body, and that the catalyst is supported on the metal oxide film. The metal body includes a wavelike plate shape in section.

As discussed above, Kawamura '784 describes a reaction catalyst layer (13) that is provided on an inner wall surface of a groove (12) and a first surface of a substrate (11).

³ See Kawamura '859 at paragraph [0066].

Bowe describes a reactor (40) that includes a stack of plates (42) with grooves (44) that extend across the entire width of each plate (42). A carrier foil (46) coated with a ceramic coating that includes a catalyst material is located in each groove (44).⁴ The outstanding Office Action asserts:

It would have been obvious to one having ordinary skill in the art at the time of the invention to shape the metal body of Kawamura '784 as wavelike as in Bowe to increase surface area of the reaction.⁵

Applicants respectfully disagree. As discussed in the telephone interview, Kawamura '784 teaches a reaction catalyst layer (13) that is provided on an inner wall surface of a groove (12), and fails to disclose or suggest a reason to modify the location of the reaction catalyst layer (13), much less modify the compact chemical reactor by the teachings of Bowe.

Moreover, M.P.E.P. § 2143.01(VI) states that “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).” In the present case, the outstanding Office Action proposes to modify the Kawamura '784 device based on the teachings of Bowe. However, such a combination would require a substantial reconstruction and redesign of the elements shown in Kawamura '784 as well as a change in the basic principle under which the Kawamura '784 construction was designed to operate. For example, the groove in Kawamura '784 has a width of about 0.2 to 0.8 mm, a maximum depth of about 0.2 to 0.6 mm and an entire length of about 30 to 1000 mm⁶, while the carrier foil has corrugations that are 2.5 mm high.⁷ In other words, one cannot simply substitute the carrier foil of Bowe into the compact chemical reactor of Kawamura '784, as the carrier foil of Bowe would not even fit into the groove of Kawamura '784.

⁴ See Bowe at paragraph [0040] and Figure 4.

⁵ See outstanding Office Action at page 6.

⁶ See Kawamura '784 at paragraph [0042].

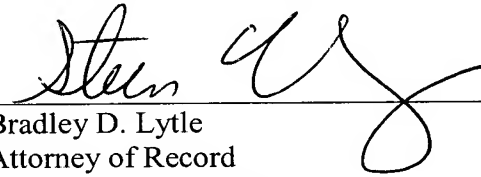
⁷ See Bowe at paragraph [0040].

Accordingly, no reasonable combination of Kawamura '784 and Bowe would include all of the features recited in Claim 31. Therefore, Applicants respectfully request the rejection of Claim 31 under 35 U.S.C. § 103(a) be withdrawn.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'Steven B. Chang', is written over a horizontal line.

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